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THE SITUATION OF NON-METALLIC MINERALS IN DEVELOPING COUNTRIES *

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Seen in a historical perspective, the non-metallic minerals were the first to be utilized by the indigenous population of the developing countries, which for the purpose of this paper we shall refer to as one more or less uniform group although, in practice, the picture is a lot more colourful. This was due to their obvious and widespread presence, their ease of mining and their usefulness as building materials and, after a modest transformation, as household utensils. In fact, the shaping of stones into building blocks and the making of simple bricks and pottery were among the very first industries to emerge.

Later, the know-how and skills required to exploit the metallic minerals were developed, and during the course of the colonial age the mining of valuable metals and ores for immediate export became the all-important area of activity while non-metallics were relegated to near oblivion or, at best, a sphere of activity of no economic importance. Industrial processing of any mineral (metallic or non-metallic) was only rarely considered.

When such processing was introduced it was, as a rule, the colonical rulers who took the initiative, since the educated and economically active part of the indigenous population by now had been brought to regard non-metallics with cool indifference. However, the expatriate residents wanting to create for themselves some of "the comforts of home" introduced the first cement manufacturers and aggregate quarries to permit accelerated construction of the accustomed standard and, as it was the case in some Asean countries, set up ceramic industries to be sure of a steady supply of teacups of the required shape and quality.

This was also the time when gradually, and often by coincidence in connection with surveys for metallic ores, economically interesting non-metallic mineral deposits were discovered and their exploitation initiated. But only to be exported as raw materials for industrial processing or consumption abroad. Local processing of minerals such as asbestos, bauxite, graphite and phosphate rock beyond rudimentary concentration is still the exception and large-scale industrialization in certain developing countries is still based on raw materials imported from other developing countries - a violation of the economic interests of <u>both</u> countries involved.

So, while the exploitation of the metalliferous minerals, coal and lately also petroleum resources thrived and eventually also resulted in the establishment of local large-scale processing plants, non-metallics continued to play a marginal role in most national economies. And, as a consequence, the majority of a typical developing country's qualified engineers and geologists were attracted by these large and prestigious mining and processing operations, while the non-metallics sector, struggling for its survival with comparatively few attractions to offer and a dubious future in terms of career development for new staff, was left at the wayside largely unnoticed by young talent.

Even national geological survey departments and other institutions dealing with mineral development failed to understand or recognize the potential of non-metallic minerals development. Or they found it forbiddingly difficult to generate the necessary financial support for extended activities in a sector with few existing industries requiring their services.

Rather a sad picture, one might conclude, leaving little hope for the future. But this was some years ago the situation of a group of minerals whose only common denominators are bulkiness, low cost and the fact that they are "non-metallic", i.e. labelled as not suitable for the metallurgical industry.

Blaming the slow development of this sector on its name alone is, of course, an exaggeration. But words have a curious effect on the minds of people. Just consider the change in attitude which occurs when the very same group of minerals is referred to as "industrial minerals".

When we consider the non-metallic minerals as industrial, or in other words, as necessary raw material inputs to a growing local industry, their importance is obvious and it becomes if not prestigious then at least justifiable from an economic point of view to deal seriously with their development.

This, in very simplified and general terms, is where we stand today. The overwhelming abundance of non-metallic or industrial minerals in the developing countries, both in terms of variety and measured by their shear volume, has been

recognized and their unrivaled potential as a basis for accelerated economic development is being understood by ever widening circles of technical, economic and political decisionmakers.

Few other sectors seem to correspond so well to the criteria defined by the developing countries themselves for an industrial development process appropriate to their resources and needs. These priorities for a reorientation of the industrialization process which were first established at the Second General Conference of UNIDO in Lima, Peru in 1975, and have later been confirmed at a number of similar, gatherings now constitute the basis for UNIDO's involvement in the industrialization process.

A systematic development of the non-metallic mineral-based industries would take advantage of their widespread occurrences even within a given country and give priority to the establishment of small-scale mining operations closely related to adjacent industries producing for the surrounding region. Building Materials such as fired clay bricks and lime cannot economically be transported over longer distances nor can they maintain a competitive price, if the raw materials need to be transported more than a few kilometers. The ideal solution which however, is not always the one preferred, is therefore to establish a number of small decentralized production units near to both raw materials and market. The advantages of low investment cost and easy operation of the small labour-intensive quarries and manufacturing plants are obvious. But also the positive socio-economic effect of building the manufacture on already existing traditions and skills in the region, of providing labour opportunities to the local population and of producing for the benefit of local consumption should not be neglected.

Very few metalliferous mineral processing industries offer the same easy and inexpensive start-up conditions as do the non-metallic mineral-based industries which lend themselves very well to a small-scale labour-intensive approach. They consequently provide a very attractive sector for a developing country in its early stages of industrialization, and it is reassuring to note that this is now being realized by an ever increasing number of planners both in the developing countries and in the industrialized countries with which they co-operate.

However, apart from industries using cheap, bulky raw materials for which the low ratio of value to weight makes transport excessively expensive and import impossible, a surprisingly large proportion of non-metallic raw materials for processing in developing countries is still being imported from abroad. There may, of course, be very good reasons for such an import such as when a glass factory finds it necessary to import not only soda ash but also the glass sand itself because local sand is too rich in iron oxides and heavy mineral contaminations to be beneficiated and delivered to the plant at a price competitive with imported high quality glass sand. In other cases the reasons behind raw material importation are not so well founded and a switch to the use of local resources at least a theoretical possibility.

But the practical implementation of such a replacement of imported raw materials by local ones and the establishment of new non-metallic mineral-based industries producing for import substitution is, unfortunately, a process with many obstacles. In the following, we shall briefly consider their nature and how they may be overcome.

A basic problem of many countries is that the domestic non-metallic mineral resources, although recorded by various general geological surveys through the years, have never been the subject of detailed qualitative and quantitative exploration. Any serious industrial exploitation must therefore in its earliest planning stages find a way to verify the existence of the necessary raw materials. And often the whole project stops here since neither the public authorities or the potential investor can mobilize the necessary funds, especially in view of the risk that the outcome of the exploration might be negative. In other words, there is a need to engage larger amounts of public funds or technical assistance funds in the verification of economically exploitable non-metallic mineral deposits. This important ground work, which must be carried out in order to generate interest from investors must be planned on the basis of a careful analysis of present mineral imports as well as new interesting application or export possibilities and at the same time limit itself to sites with relatively easy access.

Once a given deposit has been thoroughly studied it is still too early to expect prospective users to cue up for a mining licence. This is typical for non-metallic quarrying operations that the preparatory work weights heavily on the overall investment budget and private, especially foreign investors, would normally be reluctant to even consider investing in the opening and development of the mine or quarry without a well-defined quarry legislation. Although the UN stands ready to provide the necessary advice such legislation takes time to formulate and pass through the administrative machinery and attractive investment propositions may quickly vanish if the Government has not had the foresight to bring the legal side of mineral exploitation in order before launching a non-metallic mineral development scheme.

Another problem which might make a potential investor in an industrial undertaking or an already existing industry using at least partly imported raw materials hesitate or refuse to use a well documented and economically exploitable local raw material could be quality specifications below international standards or possibly just a fear that the quality could be below a comfortably high level. This reaction is understandable but, unfortunately, not very conducive to a steady development of the domestic non-metallic minerals sector. UNIDO knows several examples from its co-operation with developing countries of so-called low quality raw materials which after some beneficiation or adjustment of the user industry's processing technology yielded perfectly acceptable products and resulted in important foreign savings for the national economy. If, for instance, a ceramics manufacture composes its earthenware body of imported kaolin, quartz and feldspar, it requires some courage but pays handsomely off to switch to a local primary deposit of weathered granite which from nature has a kaolin/quartz/feldspar ratio which only needs minor adjustments to suit the technological requirements of the production.

It is not only the traditional respect for the "safe" imported raw materials with guaranteed chemical and physical specifications which make industries in many developing countries prefer this expensive solution. Often it is the lack of adequate local research and development facilities including equipment as well as trained and motivated staff capable of verifying the industrial potential of domestic non-metallic mineral resources and developing technologies corresponding to the raw material characteristics and the real requirements of the market.

The establishment of a national laboratory with both analytical capacity and the know-how and equipment to carry out technology development work in close co-operation with on the one hand the geological survey department and on the other the potential user industries or institutions responsible for planning and promoting new industries should be high on the priority list of developing countries with recorgnized potential for a broad range of non-metallic industries based on domestic resources.

The institutional affiliations of such a "non-metallic minerals development center" and its sources of financing may differ widely from country to country but experience seems to show that only with a sound national support function of this kind it is possible to achieve a rapid development in the non-metallic minerals sector.

To break the dependence on imported minerals and technologies, not to mention dependence on imported finished products which could have been locally manufactured, is a task very few developing countries are capable of fulfilling entirely on their own. This is what technical co-operation is all about!

Other countries have already gone through the same process and have gained their experiences, often painful but mostly, in the end, rewarding. And today this experience which was acquired over many years is available to the developing world in various forms which it might be useful to consider briefly at this point.

The classical form of technical assistance with its emphasis on missions of shorter or longer duration carried out by experts primarily coming from industrialized countries is still the dominating source of technology transfer to developing countries. By and large, it is an efficient way of introducing new ideas for non-metallic minerals utilization and for promoting the implementation of development and investment projects. This type of assistance, however, suffers from the relatively high cost of international consultants which, under the constraint of limited financing possibilities, reduces the number and scope of possible co-operation acitivities.

On this background, the concept of twinning arrangements between institutions involved in similar activities as, for instance, the development of the non-metallic minerals sector, has evolved. The twinning between two geological surveys or two research and development institutes in different countries implies a long-term agreement covering exchange of information and experience both directly through mutual visits or indirectly through reports or research papers. Several institutions in the industrialized countries are now prepared to enter into this kind of co-operation.

However, even more relevant to the solution of the problems prevailing in a developing country is the experience gained in another developing country, and a south-south twinning arrangement or, in other words, Technical Co-operation among Developing Countries (TCDC) is therefore today considered as the most cost-effective way of raising a country's technological level in keeping with its needs and resources.

To apply these resources in a way resulting in the optimum socio-economic development of the developing countries is by no means a simple task if the overall situation is considered. If, on the other hand, attention is focused on the non-metallic minerals sector as this paper has done, albeit in a very brief and general form, it is obvious that more financial resources, national as well as international, invested in the development of domestic mining and processing operations would be one of the most promising ways of accelerating the exploitation of the enormous wealth of non-metallic mineral resources for the benefit of the developing countries and their peoples.